



AGROFORESTRY

SYSTEMS AND PROSPECTS

E D I T O R S



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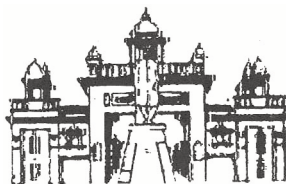
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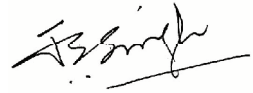
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Foreword

Agroforestry is an emerging science in the field of natural resource management. Trees in agroforestry systems moderate climatic conditions, add organic matter in-soil through leaf and root litter, scavenge nutrients from deeper depths and deposit on the surface soil, thus placing them in an active nutrient recycling pool, protect soils from rain beating and wind erosion; all of the above help together in soil conservation. Trees also facilitate infiltration of water and reduce evaporation and thereby conserve soil moisture in all climatic conditions particularly more in arid conditions. Agroforestry systems also enhance crop diversity particularly more in homegardens, which provide different products and ensure nutritional security and systems stability. Homegardens integrate livestock and fish farming in an interactive manner, which make the system efficient in functioning.

Though suitable tree/crop combinations are worked out for all agroecological conditions under All India Coordinated Research Project (AF) of ICAR involving almost all agricultural universities of our country and proper tree spacing and management techniques are standardized and recommended, farmers still prefer traditional agroforestry systems, which are time tested, have developed over generations and fulfil their maximum day-to-day needs like fuel, food, fruit, fibre, wood *etc.* Some modern agroforestry systems, which feed industry, have also got a place of pride in farmer's fields. The present compilation takes care of putting all these information on one place in the form of a book.

The editors have done a commendable job of bringing the diverse contributions into one publication. I am sure this book will serve as a repository of information in the field of agroforestry, which can be used by planners, researchers and undergraduate and postgraduate students pursuing studies in the field of forestry/agroforestry.

A handwritten signature in black ink, appearing to read 'J. S. Singh', with a horizontal line drawn underneath it.

J. S. Singh

Professor Emeritus

Preface

Agroforestry is an ages old practice, being followed throughout the world particularly more in developing countries in the tropics. World over, studies are being conducted to understand structure and functioning of the ages old and time tested agroforestry practices and improve their productivity. In India, studies on agroforestry date back to 1979 when Indian Council of Agricultural Research, New Delhi organized a seminar on Agroforestry at Imphal. Keeping in view the diversity in climate and edaphic conditions in our country a network project that included scientists and institutes of different agroecological regions, were considered; this paved way to the development of All India Coordinated Research Project (AICRP) on Agroforestry in 1983. In the beginning head office of the AICRP was at Krishi Bhawan, New Delhi, which later on 1997 shifted to National Research Centre (Agroforestry) at Jhansi, U.P. There were 20 centres in the network project, which included 12 State Agricultural Universities (SAU) and 8 ICAR institutes. Later more coordinating centres were added; at present there are 27 State Agricultural Universities and several ICAR institutes, which are working systematically in different aspects of agroforestry in major agroecological zones of the country.

Today, more than 25 years after meticulous studies, agroforestry has emerged as a robust land use which advocates crop diversification, soil and soil-water conservation, cycling of organic matter and sequestration of CO₂ in plant and soil. Different area wise agroforestry models are available now, which enhances unit land productivity and fulfil, fuel, fodder, fruit and timber needs of farmers. Area specific researches undertaken by SAUs and ICAR institutes have generated volumes of information but their availability is limited; hence the information do not become available to agroforesters and students pursuing their studies in the field of agroforestry. During our tenure as a Professor we felt a need for lucid compilation of such research material for use by agroforesters and students undertaking the study of agroforestry. Thus we felt compelled towards compilation of the available information on agroforestry systems prevailing in various agro-ecological conditions across the country. We sincerely wish that this book will help planners, agroforesters and undergraduate and postgraduate students.

The book includes total 26 chapters; the first 10 chapters describe traditional agroforestry systems found in different parts of our country. Despite the fact that crop yields decline under trees in the traditional systems, farmers follow them. This is simply because trees fulfil their day-to-day basic needs and provide a handsome income after completion of their rotation cycle, which compensates loss suffered by crops during the tree growth period. Homegardens, having a multi-tire in structure, are another example of traditional agroforestry system found generally in northeast and southern part of our country. Long ago, roads were lacking and organized markets were not available. This forced homegardens to plant almost all trees species which fulfilled their fuel, fodder, fruit, spice, vegetable, and other needs. They planted these plant species according to their needs; the knowledge was acquired from their ancestors which accumulated over generations. This is reason all planted species share natural growth resources in a compatible manner and function in a complementary manner. The homegardens also serve as a storehouse of biodiversity and provide not only dietary but also nutritional security to homegardeners. Chapters 11 to 14 deal with some modern agroforestry models, and mechanism of competitive interaction found in agroforestry systems. Chapter 15 to 19 describes nutrient cycling and natural growth resources conservation by agroforestry systems. Tree has both protective as well as productive role. Tree canopies protect soils from rain beating and wind blowing whereas fine roots bind soil particles together and thereby protect soils from erosion. Trees recycle leaf and root litter and nutrients and make system at least semi-sustainable. Different models of agroforestry like shelterbelt and wind breaks are known to help protect environment from dust and sand dunes drifting; some models like medicinal plant based system that provide medicinal and other high value crops. These service oriented functions of agroforestry are described in chapter 20 to 23. Tree improvement is an important aspect of agroforestry study. It helps develop plus trees for different agroforestry models. Multiplication of propgules and planting materials are equally important for development of agroforestry. These information are provided in chapters 24 and 25. Economics is the most vital part of agriculture production system; farmers adopt only those agroforestry systems which are economically viable. Generally people study economic viability of agricultural production system using a single cost / benefit ratio parameter. But, agroforestry systems require much more parameters owing to their perennial nature. The last chapter describes economic parameters like NPV, IRR, annuity, sensitivity *etc.* in detail.

The compilation could become possible due to efforts of the contributors of the chapters who compile works nicely. I thank the Director of Central Agricultural Research Institute, Port Blair, Andaman and Nicobar Islands who always encouraged us to compile the works in the form of a book.

C.B. Pandey
O.P. Chaturvedi

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Readership: The book will be extremely useful for those related to the fields of Horticulture, Forestry, Agroforestry and Natural Resources Management.

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